

# Stormwater Asset Inventory and Condition Assessments to Support Asset Management

## Session 12710

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# Overview

- ❖ Utilities Asset Management Overview
- ❖ Air Combat Command's Utility System Inventory and Condition Assessment Project Overview
- ❖ Stormwater Utility System Review and Results
- ❖ Lessons Learned
- ❖ Recommendations
- ❖ Way Ahead

# Utilities Activity Management Plans (AMPs)

## Utility System Level of Service:

### ❖ Drinking Water:

- supply potable water to all buildings on the Base's network;
- ensure that an adequate supply of water is available for fire fighting when needed; and
- supply water for irrigation in accordance with water conservation principles and practices

### ❖ Domestic & Industrial Wastewater / Stormwater discharges;

- collect, manage, treat and dispose of domestic and industrial wastewater (D & IWW), and stormwater (SW) from the Base

# Utilities AMP – Table B3A Levels of Services, Measures and Targets

3.	Asset Preservation, Development and Consolidation	Sustainment, restoration and modernization work is being properly planned for in advance, and effectively and efficiently carried out when due	A reduction in the amount of deferred maintenance
5.	Service Quality (including Aesthetics, Reliability, Responsiveness and Capacity)	The consumers/users are satisfied with the quality of the service, and with the way that it is being delivered	A reduction in the number of utilities direct schedule work orders (DSWs)
6.	Compliance (including Record Keeping and Reporting)	All legislative, regulatory, DoD and Air Force requirements are met	<p>100% compliance with applicable federal, state and local legislative and regulatory requirements; and all actions meet DoD and Air Force policy requirements and guidelines</p> <p>100% compliance with the management and technical service standards, and with all reporting, and performance verification requirements</p>

# Utilities AMP – Table A4 Key System Statistics

❖ AMP Key System Statistics includes information for all utility systems; such as:

- Lineal feet of utility line
- No. of treatment plants
- No. of connections
- No. of manholes, catch-basins, valves, etc.

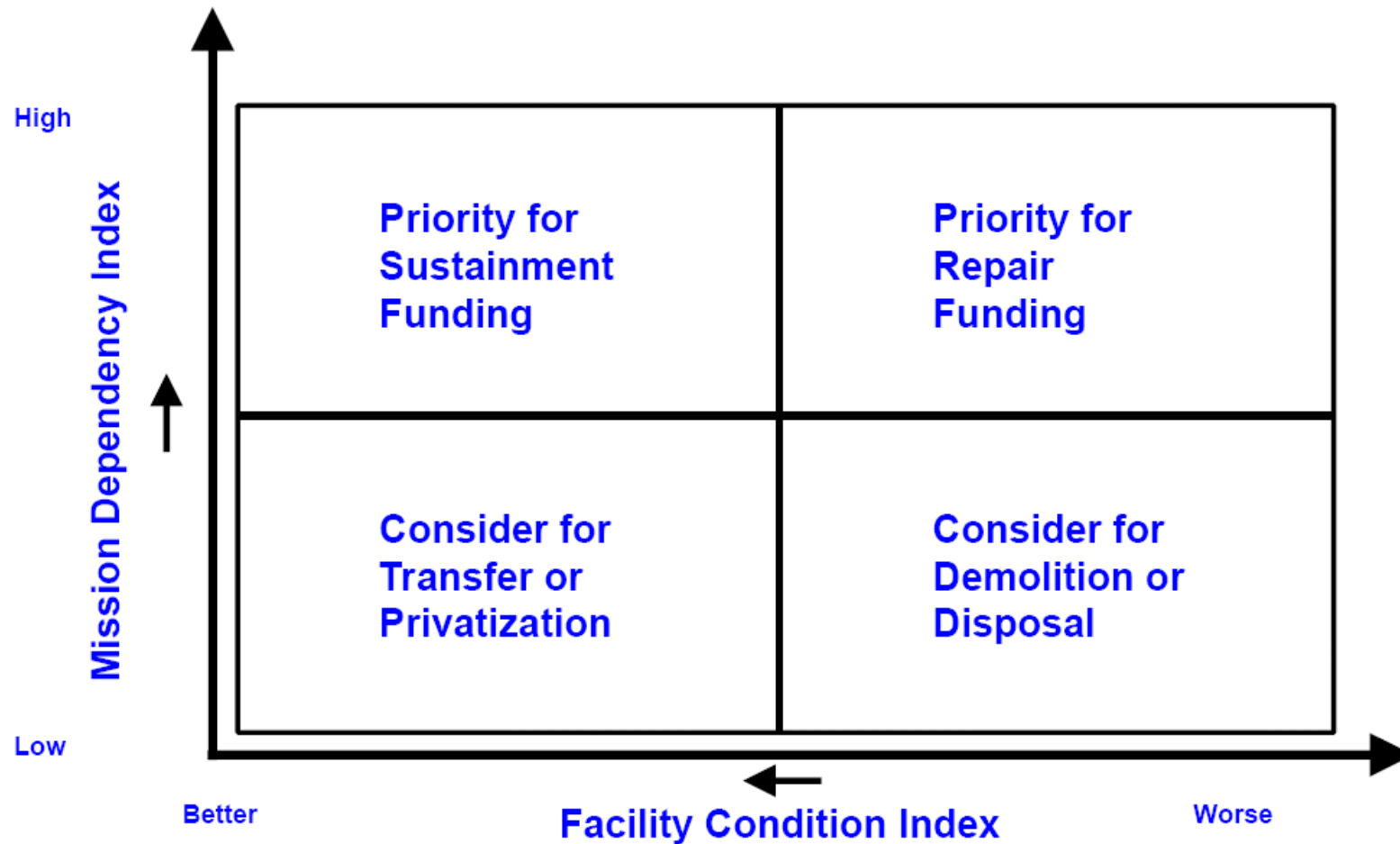
Factor	UM	Quantity
<b>Population</b>	No.	13,000
<b>WATER SUPPLY</b>		
<b>Water Supply Connections</b>		
Facilities connected to potable water	No.	1,195
<b>The Potable Water Network</b>		
Distribution	LF	525,810
Treatment Plants	No.	0
Valves	No.	1,962
Reserve Storage	Days	1
<b>General Water Supply Information</b>		
Potable Water		
How Sourced	Description.	for the main base and 13 wells for remote areas
Average Daily Consumption	MG	3
The number of people exposed to unsafe drinking water at any time during the year	No.	0
<b>Water Supply Asset Values</b>		
Replacement Value	\$000,000	Not Evaluated
Depreciated Replacement Value	\$000,000	Not Evaluated
<b>WASTEWATER</b>		
<b>Wastewater Connections</b>		
Facilities Connected (to DWW)	No.	1,195
Facilities Connected (to both DWW and IWW)	SF	1,195
<b>The DWW Network</b>		
Collection Lines	LF	387,045
On-Site Treatment Systems	No.	17
<b>The SW Network</b>		
Retention/Detention Areas	Ac- Ft	N/A
Outfalls	No.	13
<b>General WW Information</b>		
Discharge Volumes		
DWW	Avg. MGD	2
IWW	Avg. MGD	N/A

# Asset Prioritization – FCI & MDI

## **From AF Asset Management 22 Jan 09 e-Bulletin:**

- ❖ Asset Optimization: Knowing Where to Invest the Next \$
- ❖ In conjunction with the work on Activity Management Plans (AMPs), the Air Force is developing optimization tools to integrate and prioritize requirements.
- ❖ This e-Bulletin provides an update on our Facility Condition Index (FCI) and Mission Dependency Index (MDI) efforts. After all, knowing where to invest our next dollar depends on:
  - 1) knowing the condition of our assets, and
  - 2) knowing the risk of mission failure if particular assets are not kept in proper working condition (or available at all).
- ❖ Being able to prioritize projects and allocate funding toward the greatest need is what Asset Management is all about.

# Capital Investment Strategy





# Asset Inventory & Condition Assessments

- ❖ Base's within the Air Force's Air Combat Command (ACC) were well positioned due to previous efforts that collected system data: both GIS and operational data, however:
  - Data is still not centralized
  - Map accuracy is still an issue
  - Data gaps still need to be filled

# Asset Inventory & Condition Assessments

## ❖ 3 Program Areas

- Drinking Water System Assets
- Wastewater System Assets
- Storm Water System Assets

## ❖ Pilot-Test at 2 ACC bases each

- Drinking Water: Langley & Offutt (East and Mid-West)
- Wastewater: Shaw & Holloman (East and South-West)
- Storm Water: Barksdale, Minot, Seymour Johnson (South East, Mid-West, and East)

# Asset Inventory & Condition Assessments

## Existing System Data Sources

### ❖ Drinking Water:

- Hydraulic Models
- DW Master Plans
- X-Conn/BFPD Surveys
- WVA – Part 1 (Sanitary Surveys)
- Well Head Protection Plans

### ❖ Wastewater:

- I&I Surveys
- OWS, **GT**, SS Surveys
- WW/SW Vulnerability Assessments

### ❖ Storm Water:

- SWPPPs
- I&I Surveys

# Asset Inventory & Condition Assessments

## ❖ Project Scope of Work:

- Inventory utility system components
- Collection system appurtenances information
  - Wells, pump stations, pretreatment systems, treatment plants, catch-basins, man-holes
- Conduct a condition assessment
- Update GIS with asset inventories and attributes
- Estimate replacement costs

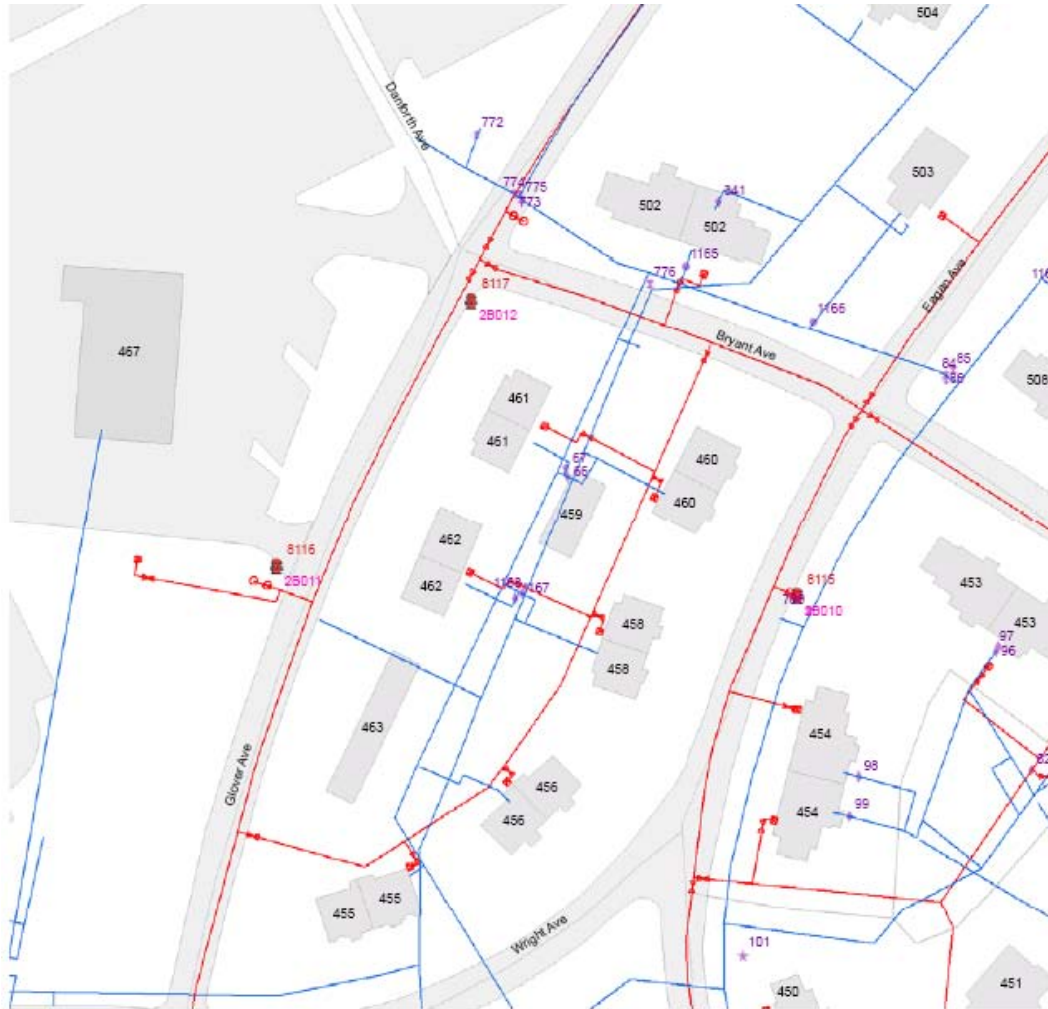
# Existing GIS Data

- ❖ As-built drawings are not typically georeferenced and imported into GIS
- ❖ Significant GIS data gaps and deficiencies were observed
- ❖ Base personnel were not aware of all utility assets
- ❖ Condition data is non-existent



Surcharged lift station not included on maintenance contract

# Existing GIS Data



- Existing GIS Map GPS Data – Red Lines
- Updated GIS Map GPS Data – Blue Lines

# Storm Water Inventory and Condition Assessment

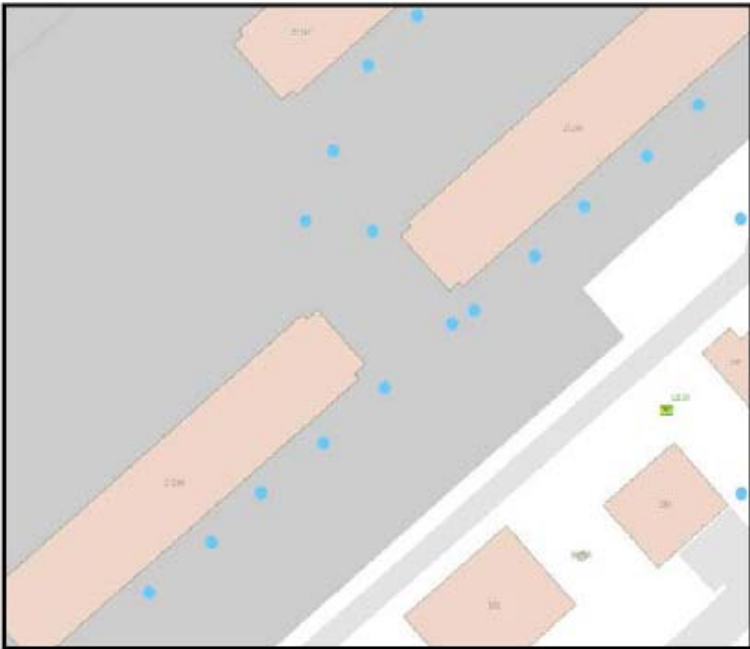
❖ Collect utility system information: manholes, pipes, drainage structures, catch-basins, retention/detention ponds, swales, outfalls, inspection / dry wells, pre-treatment units

❖ Data collected:

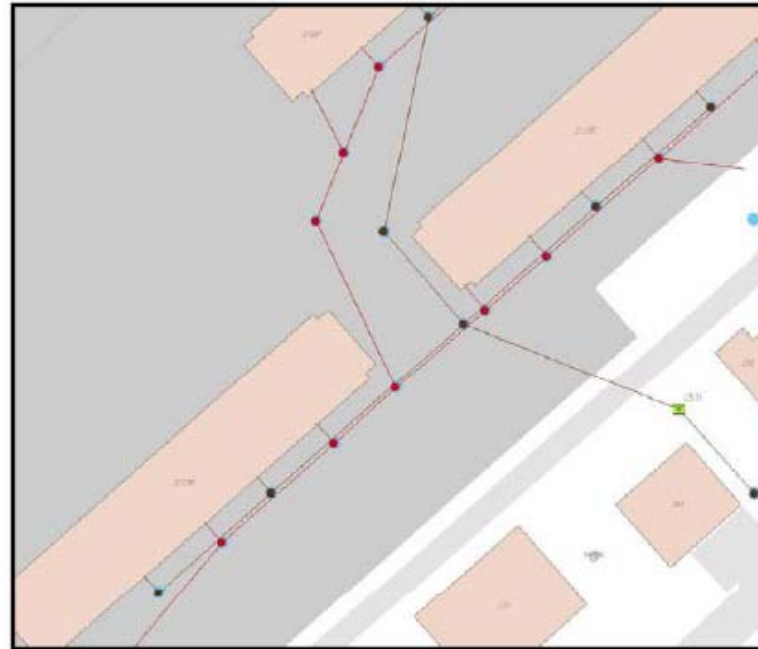
- Location
- Depth
- Age
- Condition
- Dimensions
- Type of material
- Depth to Invert
- Asset photo
- Criticality
- Connectivity

# GIS Data Gaps / Deficiencies

## Connectivity



Before



After



# GIS Data

❖ Bases received updated SDSFIE-compliant GIS that includes the following:

- Improved mapping (asset locations and connectivity) with GPS'ed locations and infrastructure data
- Updated / populated attribute tables



OB	SUBTYPEID	wwtrmhl_id	dispostn_d	use_d	type_d	no_pipes	elv_u_d	mat_d	mh_dia	mh_width	dim_u_d	instln_id
1	201990	113716	IN_SERVICE	MANHOLE	UNDERGROUND	2	IN	PRECAST	32.00	48.00	IN	KWRD
2	201990	MH407	IN_SERVICE	MANHOLE	UNDERGROUND	2		PRECAST	0.00	0.00		KWRD
3	201990	MH307	IN_SERVICE	MANHOLE	UNDERGROUND	2		<Null>	0.00	0.00		KWRD
4	201990	113731	IN_SERVICE	MANHOLE	UNDERGROUND	2	IN	PRECAST	32.00	48.00	IN	KWRD
5	201990	MH285A	IN_SERVICE	MANHOLE	UNDERGROUND	1		PRECAST	0.00	0.00		KWRD
6	201990	MH293A	IN_SERVICE	MANHOLE	UNDERGROUND	2		<Null>	0.00	0.00		KWRD
7	201990	MH316	IN_SERVICE	MANHOLE	UNDERGROUND	4	IN	OTHER	27.00	36.00	IN	KWRD
8	201990	MH431B	IN_SERVICE	MANHOLE	UNDERGROUND	2	IN	PRECAST	32.00	42.00	IN	KWRD

# Storm Water Inventory and Condition Assessment

## ❖ Simplified Methodology

- Pre-field Inventory - Use existing GIS, AutoCAD, as-builts, studies and interviews
  - Identify areas of concern
  - Identify areas that need additional data collection
- Field work
  - Safety is key!
  - Hand held GPS unit with ArcPad data collection device, obtain inventory and condition data quickly
- Post-field work – update GIS and relational tables with inventory and condition assessment values

# Storm Water Inventory and Condition Assessment

## ❖ Inventory issues

- GIS layers do not contain all storm water assets or data required to support AMP
  - Date acquired not included for many asset
  - Some asset data not complete/consistent
- Previous GIS incorrectly labeled electrical vaults, storm water manholes, etc. as wastewater manholes / appurtenances

# Storm Water Inventory and Condition Assessment

❖ Use the latest technology to ensure efficient and accurate data collection

- Trimble GeoXT Handhelds
- Geo-referenced digital photos
- Use of LIDAR



# Storm Water Inventory and Condition Assessment

Automate Initial and Long-term Data Collection

- ❖ Utilized hand-held equipment available to base utility and GIS personnel.
- ❖ Developed ArcPad data entry sheets; no paper used except reference maps on where to go in the field.

The image displays three screenshots of the 'storm\_sewer\_line' data entry form, likely from an ArcPad application. Each screenshot shows a different tab of the form:

- Left Screenshot (Pipes General):** Fields include PipeID, SubType, Visit Date (3/29/2010), Found, Weather, Crew, New Type, Chng Type, and Chg Rsn. The 'US Co' dropdown is visible.
- Middle Screenshot (US Condition 1):** Fields include Material, Dia/Depth, Width (0), and a Narrative text area. The 'US C' dropdown is visible.
- Right Screenshot (US Condition 2):** Fields include Us Measure (0), Pipe Cond, US Photo, Defect, Defect Comments, and General Comments. The 'DS C' dropdown is visible.

Each screenshot has a blue title bar with the text 'storm\_sewer\_line' and a red 'X' button. At the bottom of each form, there are green 'ok' and red 'X' buttons.



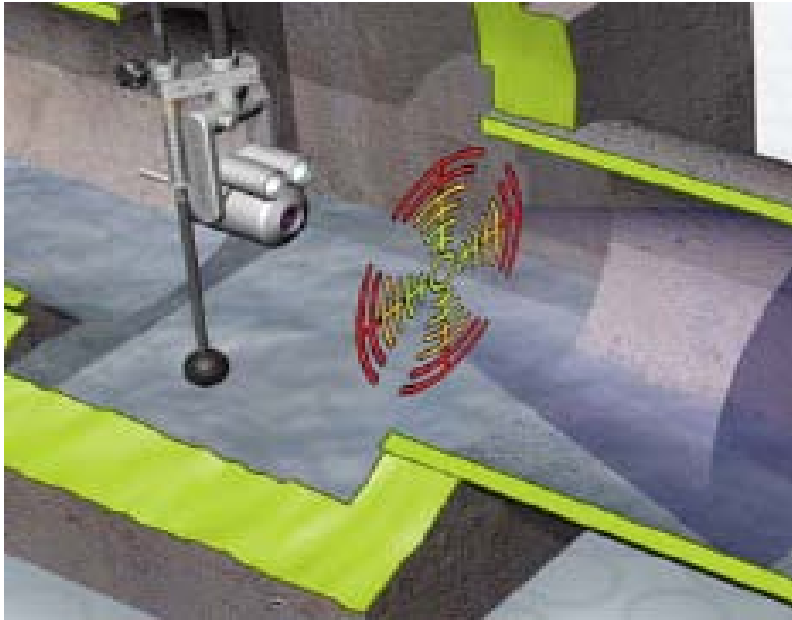
# Storm Water Inventory and Condition Assessment

- ❖ Importance of Condition Assessment to identify and document system issues



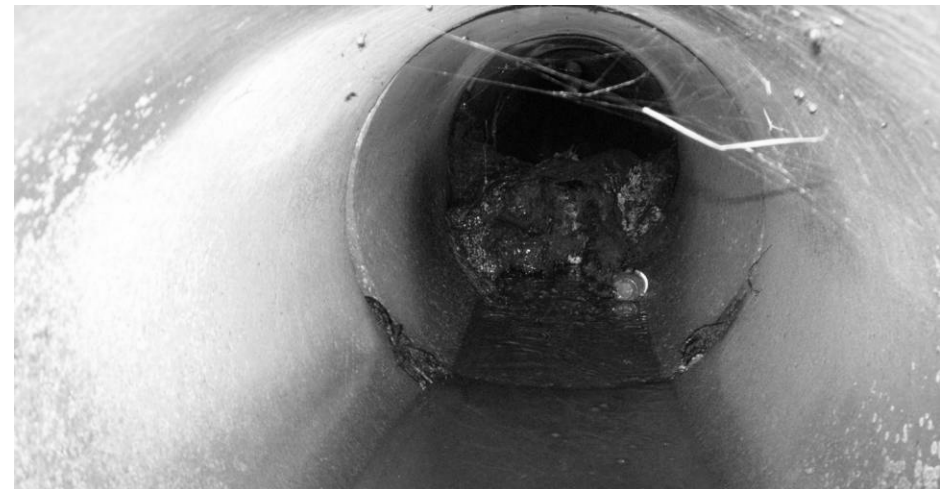
# Storm Water Inventory and Condition Assessment

Inventory, connectivity, and condition assessment tools; innovate to save time; used EnviroSight's *QuickView* camera





# Storm Water Inventory and Condition Assessment





# Storm Water Inventory and Condition Assessment

## ❖ Inventory findings

- Installation #1 – 1,675 assets
  - Added 141 new assets to the GIS (primarily headwalls/culverts)
  - Deleted 145 assets (primarily inlets)
- Installation #2 – 2,594 assets
  - Added 93 new assets to the GIS (primarily inlets)
  - Deleted 114 assets
- Installation #3 – 5,058 assets
  - Added 920 new assets to the GIS (primarily inlets)
  - Deleted 440 assets (primarily manholes/lines)

# Storm Water Inventory and Condition Assessment

## ❖ Condition assessment findings

- Standardized evaluation guide to ensure all field crews assess condition the same way
- Need to quickly and easily perform condition assessment of storm water piping system
- Spending time in the office overlaying the data to then field verify is not the most efficient use of time. Start with the best available map, then add to it.

# Path Forward

- ❖ Add on to the SDSFIE compliant GIS with other asset information that is critical to managing the utility system
- ❖ Include the following in the updated GIS file:
  - Additional inventory data
  - Condition assessment



- Links to photos showing and rating different asset components criticality
- Estimated replacement costs



# Storm Water Inventory and Condition Assessment

## ❖ Lessons Learned/Recommendations

- Initial inventory is challenging to ensure all assets are included in the GIS; once GIS is updated:
  - it needs to be maintained for new projects;
  - a process needs to be created to ensure it is.
- Innovative approaches can speed up field efforts
- Potential to include condition assessment data within the GIS rather than relational table will reduce duplicate data sources.

# Conclusions

- ❖ USAF Asset Management continues to evolve and the program is being refined
  - Linear segmentation
  - Condition assessment methodologies
- ❖ Detailed knowledge of your assets is key
- ❖ We still need to know costs of deferred maintenance
- ❖ Developing your data now, and accessible repositories for that data, will put you ahead of the curve and save resources later

❖ Questions?

❖ Contact Information:

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